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PHILLIPS ET AL
Serial No. **10/706,142**
Filed: **11/12/2003**

REMARKS

Claims 1-7 are pending in this application.

Claims 1-7 are rejected in this non-final Office Action under U.S.C. 103(a) as being unpatentable over Uyama et al. (5,700,550) in view of Coombs et al.

The Office Action states that Uyama et al. disclose the basic claimed method of making a security article including applying an optical interference pattern to one side of a light transmissive substrate (base 2) and forming a color shifting optical coating 10 on the same side of the substrate. The Examiner notes that Uyama et al. essentially lack the aspect of placing the hologram and the color shifting coating on opposite sides of the substrate. The Examiner also correctly notes that the substrate in the Uyama et al. teaching is not embossed but has an additional layer thereon which has embossing.

Applicant has amended claim 1 to more clearly define the invention and to more closely follow the claim wording of his issued United States Patent 6,761,959 examined by the Examiner of this instant application.

Claim 1 of U.S. patent 6,761,959 reads as follows:

1. A security article comprising:

a light transmissive substrate having a first surface and an opposing second surface, the first surface having a diffraction grating pattern or a holographic image

pattern and the second surface being substantially planar; and

a color shifting multilayer optical film on the second surface of the substrate, the optical film comprising:

an absorber layer on the second surface of the substrate;

a dielectric layer on the absorber layer; and

a reflector layer on the dielectric layer;

wherein the optical film provides an observable discrete color shift such that the article has a first background color at a first angle of incident light or viewing and a second background color different from the first background color at a second angle of incident light or viewing, the article exhibiting an optical diffraction grating pattern effect or a holographic image pattern effect in addition to the first and second background colors.

The proposed amended method claim of the instant application now closely parallels the claim to the security article defined above.

Claim 1 of the instant invention clearly recites a method of forming two structures on opposite sides of a light transmissive substrate; a hologram or grating on one side and a color shifting structure on a second side.

Uyama et al. do not suggest placing these two optical structures on opposite sides of a light transmissive substrate. Disposing these structures in this manner has a profound, unexpected, synergistic visual effect. A highly color shifting device is provided wherein the hologram appears to float in space.

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Uyama et al. teach a transparent hologram seal that can be applied as a security article. Uyama et al. appear to place the hologram and color shifting layer on the same side of a light transmissive substrate. The color shifting layer is an evaporation coating layer comprised of alternatively arranged high and low refractive index layers, such that it changes color as light either transmits or reflects through the layer when the viewing angle is changed. The multilayer evaporation layer serves as the color shifting multilayer optical coating. It should be further noted that Uyama et al.'s absence of a reflector layer as defined in claim 3 of the instant claims, makes his device inferior to the Applicants' embodiment having a reflector layer yielding high chroma. For Uyama et al. to have high chroma, his device is best placed on a black background. This requirement is obviated by Applicants' structure by inclusion of a reflective layer.

In contrast to the instant claimed invention, Uyama et al. do not teach that the color shifting coating layer is formed on the second surface of the substrate, opposite to the first surface, (where the hologram layer is formed).

In contrast to the teachings of Uyama et al., Applicants' claims define a method that yields a structure wherein the microstructural interference pattern is disposed (a predetermined distance) on the other side of the substrate from the color shifting multilayer optical coating overlying the second surface of the substrate.

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It should be understood that forming the interference structure on the same or different sides of the substrate is 'not the same'; they have profoundly different visual effects.

There is a significant and unexpected advantage to having this predetermined separation between the microstructure interference pattern and the color shifting coating; it ensures that the color of the hologram will be 'true', and not a result of significant interference between the hologram or microstructural interference pattern with the color shifting coating. Applicants' claimed method yielding a structure, having the hologram or interference pattern on the first side of the light transmissive substrate with the color shifting coating on the second side, essentially provides a buffer between the color shifting coating and the interference pattern to obviate or lessen any interaction between the layers. The physical effect of this is a hologram resulting in a more "true" color and an optical effect wherein the hologram seems to be floating on or above it's background. The resulting image appears to allow the viewer to look behind or around the hologram.

The method and structure taught by Uyama et al. simply does not provide these advantages.

A resulting hologram, which preserves its integrity in the presence of a thin film color shifting coating is provided by the instant invention as defined in amended claim 1 as shown above. This has advantages over all of the structures proposed by Uyama et al.

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Because the instant invention requires placing the interference filter such as a hologram on the opposite side of the substrate from the color shifting filter, a different optical effect is achieved than placing it on the same side with the hologram. The thickness of the substrate, for example PET, typically of 12 to 25 microns, is sufficiently thick that one can see "under", i.e., "around and under" the hologram to view the color shifting filter.

This parallax advantageously gives the hologram an appearance of floating over a background of a color shifting coating that one does not have if both hologram and thin film filter are on the same side of the PET substrate.

Uyama et al. do not explicitly state or show an embodiment wherein the OV coating and the hologram or grating pattern are on opposite sides of a substrate.

In reviewing the parent United States patent, the Examiner in her reasons for allowance in view of Uyama et al. and Coombs stated the following:

"The prior art fails to teach or suggest the recited security article. The structural limitations that overcome the prior art of record include a security article comprising a light transmissive substrate having a first surface and an opposing second surface, the first surface having a diffraction grating pattern or holographic pattern and color shifting multilayer optical film on the second surface of the substrate, the optical film comprising an absorber layer on the second surface of the substrate, a dielectric layer on the absorber layer, and a reflector layer on the dielectric layer.

The optical film provides an observable discrete color shift such that an article has a first background color at a first angle of incident light or viewing and a second background color different from the first background color at a second angle of incident light or viewing, the article exhibiting an optical diffraction grating pattern effect or a holographic image pattern in addition to the first and second background colors.

The prior art of record specifically fails to teach a transparent substrate with a diffraction grating pattern or holographic image pattern on one side and the claimed color shifting multilayer optical film on the opposing surface."

In addition to the above-mentioned differences in the structure and function of the device taught by Uyama et al. and that claimed by Applicants, there are further differences an observer would notice when viewing the two optical devices.

As is disclosed in U.S. patent 5,700,575 line 30, col. 5, Uyama et al. teach and illustrate a transparent substrate (2) called a base member through which he views the optical device. When one views the hologram such as that described by Uyama et al., the surface of the flat plastic (the PET base member) causes a certain amount of gloss, which interferes with the optical performance of the device. At some angles, the gloss, which is reflective light coming from the surface of the plastic, overwhelms the diffractive effect from the hologram and the hologram can not be seen. However, in the instance wherein the hologram is on the top surface, the hologram can be readily seen as the gloss is at a minimum due to the relief structure being at the surface. Here, the relief

structure minimizes gloss. Thus, the instant claimed invention, where the hologram is on the top side and the thin film structure is on the other side of the PET (the bottom side) has optical advantages. The hologram in the instant invention as claimed, appears brighter since it is not being washed out by the gloss effect.

Furthermore, the color shift for the device taught by Uyama et al., is small compared to the color shift of the absorber, dielectric, reflector layers now defined in the claims of this application. In changing the angle of incidence from normal to 45 degrees, the device of Uyama et al. only changes the reflectance peak from 550nm to around 520nm (see Fig. 2 of '550. and text in Col. 7, lines 60-67). For the claimed three layer design using a dielectric spacer of 4QW@550nm (Uyama et al. have a thickness for the optical stack of 1 micron (10,100 A)), using 800A of Al for the reflector layer, 4QW@550nm of MgF2 and a Cr absorber thickness of 70A, Applicants' device has a total thickness of 4855A, using the following formula to calculate the dielectric thickness: 4nt=4QW we have: n =1.38 (refractive index), t = physical thickness, QW = quarter wave optical thickness so that t = 4855A A = Angstroms. Thus, for less than half the physical thickness of the optical stack, the color change in Applicants' device is from 575nm at normal to 494nm at 45 degrees - about 81nm change for Applicants' invention vs. only 30nm for Uyama et al.'s device. Stated differently, there is 2.7 times more change in color versus what is afforded by the device of Uyama et al., even though Applicants' device is one half as thick in optical design. Not only is the color shift more pronounced in the instant

invention, but the structure is less thick allowing Applicants' device to be more flexible.

Applicants believe that the rejections under 35 U.S.C. 103(a) over Uyama et al. (5,700,550) in view of Coombs et al. are traversed in view of the amendments to the claims and reasons set forth above.

Although Applicants understand that:

a) each patent application stands on its own merit; and,

b) the claims in this application are not identical to the claims in the parent application;

Applicants would like to point out that the claims in this application and the issued parent patent now closely parallel each other.

With regard to the rejection under 35 U.S.C. 103 (a), there is simply no suggestion in Coombs to use his device in Uyama et al.'s structure and vice versa.

Furthermore, neither Coombs nor Uyama et al. teach a method of obtaining a structure wherein a hologram or grating is on one side of a light transmissive substrate and wherein a thin film interference device having an absorber, dielectric and reflector layer is on the other side of the light transmissive substrate providing a color shift with viewing angle and a hologram which appears to be floating upon the color shifting background.

With regard to claim 2, the Examiner suggests that direct embossing on a substrate is conventional in the art,

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Applicants would like to point out that the inventive combination of directly disposing the hologram in the substrate itself and forming a color shifting optical coating on the second surface of the planar substrate provides a significant advantage, both from a manufacturing standpoint and from the unexpected optical effect not exhibited by the device taught by Uyama et al. Applicants have made sample devices by disposing the grating and coating on the same side, and have also produced devices in accordance with the method of claim 1 of this instant application and the difference is striking. In the instant claimed invention, what one sees is a rainbow hologram at only discreet angles (angles away the specular) and a color shift, for example, from blue-to-red, i.e. long to short wavelengths, in a continuous change from one color to another. In contrast, if the thin film optical filter employing an absorber, a dielectric and a reflector layer is on the same side as the hologram (replacing the normal aluminum reflector) then the hologram is no longer a rainbow hologram but one with discreet colors primarily dictated by the thin film interference device. An observer can readily see the difference. Furthermore, there is no hint or suggestion to separate the color shifting coating from the substrate by disposing the diffraction grating on one side and color shifting coating on the other. This discovery and unusual effect is an invention and is in no way an obvious modification. There is simply no reason to vary the process taught by Uyama et al. unless one realized that the effect in doing so would be substantially different; and it is this realization that has led to the method defined in claim 1.

Claim 2 has further been amended to more specifically define a distance or separation between the hologram and the

color shifting coating, whereas Uyama et al. merely teach a holographic layer directly upon their dielectric color shifting layers, and do not teach a light transmissive separation therebetween. This is clearly shown in Applicants' figures, for example in Fig. 1, wherein depth of the hologram is shown to be orders of magnitude smaller than the thickness of the remaining light transmissive substrate absent the grating.

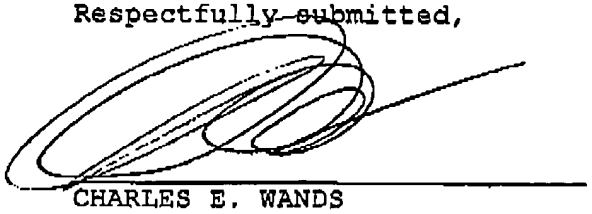
In view of the foregoing remarks and amendments to the claims, it is respectfully submitted that the instant application is now in condition for allowance.

Early and favorable reconsideration of the Examiner's objections would be appreciated.

Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. 50-1465 and please credit any excess fees to such deposit account.

Respectfully submitted,



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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number **571-273-8300** to MAIL STOP AMENDMENT, COMMISSIONER FOR PATENTS, this 2 day of November 2005.